[1] "\r\n\r\n\t\r\n\r\n\r\n \r\n \r\n \r\n Physeter macrocephalus\r\n — Sperm Whale\r\n \r\n \r\n \r\n \r\n \r\n Glossary\r\n \r\n\r\n\r\n\r\n\r\n\r\n \r\n SPRAT\r\n Profile\r\n \r\n\r\nFor information to assist regulatory considerations, refer to Policy Statements and Guidelines, the Conservation Advice, the Listing Advice and/or the Recovery Plan. \r\n\r\n\r\n\r\n \r\n EPBC Legal Status and Documents\r\n \r\n \r\n Top\r\n \r\n\r\n\r\nEPBC Act Listing Status\r\n \r\n\t \r\n\t\t\t\r\n\t\t\t Cetacean\r\n\t\t\t as Physeter macrocephalus\r\n\t\t\t \r\n\t\t\t \r\n\t\t\t\r\n\t\t\t\r\n\t\t\t Listed migratory -\r\n\t\t\t \r\n\t\t\t\t\tEPBC Act as Physeter macrocephalus, \r\n\t\t\t \r\n\t\t\t\tBonn as Physeter macrocephalus\r\n\t\t\t \r\n\t\t\t\r\n\t\t\t\r\n\t\t\t\r\n\t\t\t\r\n\t\t\t\r\n \r\n \r\n\t Approved Conservation Advice\r\n\t\t\r\n\t\t\r\n\t\t \r\n\t\t\tThere is no approved Conservation Advice for this species\r\n\t\t \t \r\n\t\t\r\n \r\n\t\t Listing Advice\r\n\t\t\r\n\t\t\r\n\t\t\r\n\t\t\r\n\t\t\tThere is no Listing Advice for this species\r\n\t\t\t\r\n\t\t\r\n\t\t\r\n \r\n\t\t Adopted/Made Recovery Plans\r\n\t\t\r\n\t\t\r\n\t\t \r\n\t\t\tThere is no adopted or made Recovery Plan for this species\r\n \r\n\t\t\r\n \r\n\t\t Adopted/Made Threat Abatement Plans\r\n\t\t\r\n\t\t\r\n\t\t\r\n\t\t\tNo Threat Abatement Plan has been identified as being relevant for this species\r\n\t\t\t \r\n\t\t\t\r\n \r\n\t\t Marine Bioregional Plans\r\n\t\t\r\n\t\t\r\n\t\t \r\n\t\t\t Department of Sustainability, Environment, Water, Population and Communities (DSEWPaC) (2012). 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In effect under the EPBC Act from 27-Aug-2012.\r\n\t\t\t \r\n\t\t \r\n\t\t\r\n \r\n\t \r\n\t\tOther Commonwealth Documents\r\n\t \r\n\t \r\n\t\tTop\r\n\t \r\n\t\r\n\r\n\r\n\t\r\n\t\r\n\t\t Other EPBC Act Plans\r\n\t\t\r\n\t\t\r\n\t\t \r\n\t\t \r\n\t\t \r\n\t\t\tSouth-east marine region profile: A description of the ecosystems, conservation values and uses of the South-east Marine Region (Commonwealth of Australia, 2015) [Information Sheet].\r\n\t\t\t \r\n\t\t \r\n\t\t\r\n \r\n\t Policy Statements and Guidelines\r\n\t\r\n\t\r\n\t \r\n\t \r\n\t Australian National Guidelines for Whale and Dolphin Watching 2017 (Department of the Environment and Energy, 2017) [Admin Guideline].\r\n\t \r\n\t \r\n\t Industry Guidelines on the Interaction between offshore seismic exploration and whales (Department of the Environment and Water Resources (DEW), 2007) [Admin Guideline].\r\n\t \r\n\t \r\n\t\r\n \r\n\t Federal Register of Legislative Instruments\r\n\t\r\n\t\t\r\n\t\t\tMigratory:Environment Protection and Biodiversity Conservation Act 1999 - Amendment to the List of Migratory Species (03/12/2002) (Commonwealth of Australia, 2002d) [Legislative Instrument] as Physeter macrocephalus\r\n \r\n\t State Government Documents and Websites\r\n\t\r\n\t\r\n\t NSW:Sperm Whale - profile (NSW Department of Environment, Climate Change and Water (NSW DECCW), 2005og) [Internet].\r\n State Listing Status\r\n\t \r\n\t NSW:\r\n\t\t\t\r\n\t\t\t\tListed as Vulnerable\r\n\t\t\t\t (Biodiversity Conservation Act 2016 (New South Wales): February 2021 list)\r\n\t\t\t\t as Physeter macrocephalus\r\n\t\t \r\n\t\t SA:\r\n\t\t\t\r\n\t\t\t\tListed as Rare\r\n\t\t\t\t (National Parks and Wildlife Act 1972 (South Australia): Rare species: January 2020 list)\r\n\t\t\t\t as Physeter macrocephalus\r\n\t\t \r\n\t\t WA:\r\n\t\t\t\r\n\t\t\t\tListed as Vulnerable\r\n\t\t\t\t (Biodiversity Conservation Act 2016 (Western Australia): September 2018 list)\r\n\t\t\t\t as Physeter macrocephalus\r\n\t\t \r\n\t\t \r\n Non-statutory Listing Status\r\n\t \r\n\t IUCN:\r\n\t\t\t\r\n\t\t\t\tListed as Vulnerable\r\n\t\t\t\t (Global Status: IUCN Red List of Threatened Species: 2020.2 list)\r\n\t\t\t\r\n\t\t\t\r\n\t\t NGO:\r\n\t\t\t\r\n\t\t\t\tListed as Vulnerable\r\n\t\t\t\t (The action plan for Australian mammals 2012)\r\n\t\t\t\r\n\t\t\t\r\n\t\t \r\n \r\n \r\n Naming\r\n \r\n \r\n Top\r\n \r\n\r\n\r\n\r\nScientific name\r\n \r\n Physeter macrocephalus [59]\r\n \r\n Family\r\n \r\n Physeteridae:Cetacea:Mammalia:Chordata:Animalia\r\n \r\n \r\n Species author\r\n Linnaeus, 1758\r\n \r\n Infraspecies author\r\n \r\n Reference\r\n \r\n Other names\r\n \r\n \r\n Physeter catadon [67229]\r\n Physeter catodon [70147]\r\n \r\n \r\n \r\n \r\n \r\n Distribution Map\r\n \r\n \r\n Top\r\n \r\n\r\n\r\n\r\nDistribution map\r\n \r\n \r\n\t\tThe distribution shown is generalised from the Departments Species of National Environmental Significance dataset. This is an indicative distribution map of the present distribution of the species based on best available knowledge. Some species information is withheld in line with sensitive species polices. See map caveat for more information.\r\n\r\n \r\n \r\n \r\n \r\n Illustrations\r\n \r\n \r\n Top\r\n \r\n\r\n\r\n\r\n\r\n\r\nIllustrations\r\n \r\n Google Images\r\n \r\n \r\n Other Links, Including Superseded Commonwealth Documents\r\n \r\n \r\n Top\r\n \r\n \r\n \r\n \r\n Australian Biological Resources Study, ed. (2013). Australian Faunal Directory. Australian Biological Resources Study. Available from: http://www.environment.gov.au/biodiversity/abrs/online-resources/fauna/afd/search/names.\r\n \r\n Commonwealth of Australia (2002d). Environment Protection and Biodiversity Conservation Act 1999 -

Amendment to the List of Migratory Species (03/12/2002). F2007B00765. Canberra: Federal Register of Legislative Instruments. Available from: http://www.comlaw.gov.au/Details/F2007B00765.\r\n \r\n Department of the Environment and Heritage (2005e). Australian National Guidelines for Whale and Dolphin Watching. Available from: http://www.environment.gov.au/resource/australian-national-guidelines-whale-and-dolphin-watching-2005.\r\n \r\n Department of the Environment and Heritage (2006tp). Physeter macrocephalus in Species Profile and Threats (SPRAT) database. Canberra: DEH. Available from: http://www.environment.gov.au/cgi-bin/sprat/public/publicspecies.pl?taxon_id=59.\r\n \r\n \r\n\r\n\r\n\t\r\n\r\n\r\n \r\n Newsletters\r\n \r\n \r\n Top\r\n \r\n\r\n\r\n\r\n\r\n\r\nEPBC Act email updates can be received via the Communities for Communities newsletter and the EPBC Act newsletter.\r\n\r\n\r\n\r\n\r\n\r\n \r\n Caveat\r\n \r\n \r\n Top\r\n \r\n\r\n\r\n\r\n\r\nThis database is designed to provide statutory, biological and ecological\r\ninformation on species and ecological communities, migratory species, marine\r\nspecies, and species and species products subject to international trade and\r\ncommercial use protected under the Environment Protection and Biodiversity\r\nConservation Act 1999 (the EPBC\r\nAct). It has been compiled from a range of sources including\r\nlisting advice, recovery plans, published literature and individual experts.\r\nWhile reasonable efforts have been made to ensure the accuracy of the\r\ninformation, no guarantee is given, nor responsibility taken, by the\r\nCommonwealth for its accuracy, currency or completeness. The Commonwealth\r\ndoes not accept any responsibility for any loss or damage that may be\r\noccasioned directly or indirectly through the use of, or reliance on, the\r\ninformation contained in this database. The information contained in this\r\ndatabase does not necessarily represent the views of the Commonwealth. This\r\ndatabase is not intended to be a complete source of information on the\r\nmatters it deals with. Individuals and organisations should consider all the\r\navailable information, including that available from other sources, in\r\ndeciding whether there is a need to make a referral or apply for a permit or\r\nexemption under the EPBC\r\nAct.\r\n\r\n\r\nCitation: Department of the Environment\r\n(2022).\r\nPhyseter macrocephalus in Species Profile and Threats Database,\r\nDepartment of the Environment,\r\nCanberra.\r\nAvailable from:\r\nhttps://www.environment.gov.au/sprat.\r\nAccessed Tue, 18 Jan 2022 21:36:51 +1100.\r\n\r\n\r\n\r\n\r\nWhere available the sections below provide a biological profile for the species. Biological profiles vary in age and content across species, some are no longer being updated and are retained as archival content. These profiles are still displayed as they contain valuable information for many species. The Profile Update section below indicates when the biological profile was last updated for some species. For information to assist regulatory considerations, please refer to Conservation Advice, the Recovery Plan, Policy Statements and Guidelines.\r\n\r\n\r\n\r\n \r\n \r\n \r\n Taxonomy\r\n \r\n \r\n Top\r\n \r\n \r\n \r\n Scientific name: Physeter macrocephalusCommon name: Sperm WhaleOther names: Pot Whale, Spermacet Whale, Cachalot (French)\nThe Sperm Whale was described as Physeter macrocephalus by Linnaeus in 1758. This name takes precedence over P. catodon which was also proposed by Linnaeus 1758 for this species (Rice 1998).\n\r\n \r\n \r\n \r\n \r\n Description\r\n \r\n \r\n Top\r\n \r\n \r\n \r\n Sperm Whales (Physeter macrocephalus) are the largest of the odontocetes (toothed whales) and the most sexually dimorphic cetaceans, with males considerably larger than females (Whitehead 2002a). Adult Sperm Whale females may grow to lengths of 11 m and weigh 15 tonnes, while adult males reach about 16 m and may weigh as much as 45 tonnes (Rice 1989).\nThe Sperm Whale is distinguished by its extremely large head, which takes up 25\u009635% of its total body length (Leatherwood & Reeves 1983). The lower jaw is narrow and underslung (Jefferson et al. 1993). It is the only living cetacean that has a single blowhole asymmetrically situated on the left side of the head near the tip. Sperm Whales have the largest brain of any animal (on average 7.8 kg in mature males), however, compared to their large body size, the brain is not exceptional in size (NOAA Fisheries 2007). \nSperm Whales are mostly dark grey to brownish-grey. The interior of the mouth is often bright white. Some whales also have white patches on the belly. Sperm Whale flippers are paddle-shaped and small compared to the size of the body, and their flukes are very triangular in shape with a nearly straight trailing edge, rounded tips, and a deep notch. Sperm Whales have a small dorsal fin that is low, thick, and usually rounded, while a series of bumps, or crenulations, on the dorsal ridge of the tail stock tend to be more prominent in females (Jefferson et al. 1993). The body has a corrugated, or shrivelled, appearance posterior to the head (Leatherwood & Reeves 1983).\nThere are between 20\u009626 large conical teeth, up to 20 cm long, in each side of the lower jaw of the Sperm Whale. The teeth in the upper jaw rarely erupt and are often considered to be vestigial. It appears that teeth may not be necessary for feeding, since they do not break through the gums until puberty, if at all, and toothless but otherwise healthy Sperm Whales have been observed (NOAA Fisheries 2007).\nSperm Whales, like other toothed whales, are gregarious and live in groups of up to 50 individuals, although male Sperm Whales are

sometimes solitary in high latitudes (above 40° N). The average Sperm Whale school sizes contain about 25 animals, although aggregations of such schools have been reported sometimes apparently numbering several thousand individuals. For example, a remarkable report is given in (Bannister et al. 1996) of 'animals spouting from horizon to horizon...' over seven to eight hours in a stream 70 miles wide in the Tasman Sea in February 1978 . \nThe social structure of Sperm Whales involves seasonal and geographical segregation of the populations by age, social and sexual state. Several types of schools can be recognised: matriarchal nursery schools; juvenile schools; bachelor schools; bull schools and lone bulls. Sperm Whale nursery schools of adult females and their offspring are found in lower latitudes all year round. Nursery schools are socially very tightly bonded, with individual Sperm Whales remaining in the same school for many years. On average, 10 to 30 mature females and their offspring are found within a Sperm Whale nursery group, although the group may be spread out over a large area. Female Sperm Whales are believed to remain in the same school throughout their life, but males leave to form bachelor groups that comprise older pubescent males and sexually, but not socially, mature males, all of similar size and age. Once they attain social maturity and can compete for access to females, male Sperm Whales leave these bachelor herds to associate with breeding schools, either solitarily or in small groups of usually less than six animals. Large bachelor Sperm Whales migrate seasonally to higher latitudes, probably because of better feeding conditions and reduced competition for food. \nSperm Whales perform aerial behaviours including breaching and lobtailing. These behaviours often occur in a social context and when groups are splitting or joining, although single whales also breach and lobtail.\n\r\n \r\n \r\n \r\n \r\n Australian Distribution\r\n \r\n \r\n Top\r\n \r\n \r\n \r\n Sperm Whales have been recorded from all Australian states (Bannister et al. 1996). Females and young male Sperm Whales are restricted to warmer waters, generally north of approximately 45° S, while older males travel to and from colder waters and to the edge of the Antarctic pack-ice. Sperm Whales have concentrated in a narrow area only a few miles wide at shelf edge off Albany, Western Australia, moving westwards through the year (Bannister et al. 1996). Off the Western Australian coast, where the continental shelf slopes less steeply, Sperm Whales appear to be less concentrated close to shelf edge and more widely dispersed offshore (Bannister et al. 1996). Similar concentrations of Sperm Whales have been found elsewhere in Australia, such as south-west of Kangaroo Island, South Australia.\nThe current extent of occurrence for Sperm Whales is estimated to be greater than 20 000 km² (based on the Australian Economic Exclusion Zone (EEZ) (200 nm, including subantarctic waters and Antarctica down to below 60° S) (Peddemors & Harcourt 2006, pers. comm.). Increasing ocean temperatures predicted by climate change scenarios could potentially increase the extent of occurrence, with warmer water extending southwards. This is expected to primarily affect the distribution of nursery groups of Sperm Whales, as these groups are restricted to warmer waters.\nThe area of occupancy of Sperm Whales cannot be calculated due to the paucity of records for pelagic waters off Australia and the Australian subantarctic and Antarctic territories. However, it is likely to be greater than 2000 km² (Peddemors & Harcourt 2006, pers. comm.). Future expansion of high-seas pelagic fisheries may result in increased interactions with Sperm Whales, including incidental catches and injury, potentially depleting local waters and leading to a decrease in area of occupancy.\nSperm Whales are currently considered to occur in one location throughout the Southern Hemisphere. However, using genetic techniques, Lyrholm and colleagues (1999) indicate that inter-oceanic movements have been more prevalent among male Sperm Whales than females. This is consistent with observations that female Sperm Whales have smaller geographic ranges (Dufault & Whitehead 1995).\nIt is possible that Sperm Whales, in Australian waters, occur in severely fragmented populations. Recent data suggest that vocal clan is a more important factor in genetic structure than geography in the eastern South Pacific (Rendell et al. 2005, 2006). The complex social structure of Sperm Whales may increase the potential for loss of particular subpopulations and their associated genetic diversity and social culture.\n\r\n \r\n \r\n \r\n \r\n Global Distribution\r\n \r\n \r\n Top\r\n \r\n \r\n \r\n The Sperm Whale occurs in deep waters in all oceans and confluent seas, including the Mediterranean, from the equator to the edges of the polar pack-ice (Rice 1998). Sperm Whales usually live offshore, but may occur close to coasts where water depths exceed 200 m, for example off volcanic and oceanic islands (Bannister et al. 1996). Sperm Whales are most common in submarine canyons at the edges of the continental shelf, but they also occur in mid-ocean.Assessments of Sperm Whale abundance have historically been based on analysis of whaling data. More recently however, visual surveys have produced population estimates for a total of 24% of the Sperm Whale's global habitat, allowing the revised calculation of a global population of 300 000\u0096450 000 whales (Whitehead 2002). Although this estimate is based on extrapolating surveyed areas to non-surveyed areas, without a systematic survey design, these are probably the best available and most current estimates of global Sperm Whale abundance (National Marine Fisheries Service 2006). \nIn contrast, estimates of the pre-whaling (1712) Sperm Whale

population size are about 1 267 000 individuals (Whitehead 2002). This suggests that the current population is about 32% of the pre-whaling level and is therefore considerably depleted. The greatest Sperm Whale catches have occurred since the 'modern' era of whaling with engine-powered whaling vessels, harpoon guns and other technical aids, but have almost ceased since the International Whaling Commission (IWC) moratorium on commercial whaling. Despite the high level of take (approximately 900 000 Sperm Whales), the Sperm Whale remains the most abundant of the large whale species. \nAlthough separate estimates for the Southern Hemisphere have not been specifically made, using the Whitehead (2002) method, it is predicted that there are between 150 000\u0096225 000 Sperm Whales (National Marine Fisheries Service 2006). Using Japanese Scouting Vessels (JSV) and IWC/International Decade of Cetacean Research (IDCR) survey data it has been estimated that Sperm Whale abundance south of latitude 60° S is between 3200\u009614 000 and south of latitude 30° S is 128 000\u0096290 000 (National Marine Fisheries Service 2006). \nGiven that the current and potential threats to the Sperm Whale are limited, it is likely that the global population of Sperm Whales is increasing. The current global threats include the possibility of illegal whaling or a resumption of legal whaling, entanglement in fishing gear (including 'ghost nets'), collision with ships, and negative responses to anthropogenic sounds and high pollutant levels.Because there are no estimates of the Australian Sperm Whale population size, the proportion of the global population in Australian waters is unknown.\nAlthough no subspecies are currently recognised, recent genetic analysis (mtDNA control region) of Australian Sperm Whales, and those of other major ocean regions, indicate a close relationship between the maternal lineages (Möller et al. 2005). Two new Australian maternal lineages, not previously reported in a global study of Sperm Whales, were found. This suggests that there is the potential for Australian stocks to be differentiated from those in other major ocean regions and to possess unique genetic variability (Lyrholm & Gyllensten 1998; Möller et al. 2005). These studies also found that genetic diversity of Australian Sperm Whales is low, particularly in the Albany Sperm Whales, but there is no evidence for genetic partitioning between Sperm Whales from three Australian areas (NSW, Tasmania and Western Australia). The low genetic diversity of Albany Sperm Whales may be due to the historical whaling pressure on Sperm Whale populations from this area.\nFemale and juvenile Sperm Whales may not undergo extensive latitudinal migrations, but older, larger male Sperm Whales are generally found near the edge of the Antarctic pack-ice, occasionally returning to the warm water breeding area. As such, mortalities in neighbouring countries and/or international waters may affect the Australian population.\n\r\n \r\n \r\n \r\n Surveys Conducted\r\n \r\n \r\n Top\r\n \r\n \r\n \r\n Sperm Whales are not well surveyed within mainland Australian waters. An aerial survey conducted in the late 1960s (Bannister 1968) is the only systematic survey completed too date. Their distribution is primarily assumed from incidental sightings, plus beach-cast animals, for all areas other than the Antarctic, where several ship-based cetacean surveys have been conducted.\n\r\n \r\n \r\n \r\n \r\n Population Information\r\n \r\n \r\n Top\r\n \r\n \r\n \r\n No population estimates are available for Sperm Whales in Australian waters. In the Antarctic south of 60° S, a preliminary population estimate of at least 3200\u009614 000 animals has been made (Butterworth et al. cited in National Marine Fisheries Service 2006), most of which would be mature males. Considering the Australian Antarctic Territory covers more than 42% of the continent and 25% of the coast (Crossley 1995), it is likely that approximately one quarter of the total population of mature males exist in Australian waters. The total number of mature female Sperm Whales is unknown. It is likely that the total number of mature animals within Australian waters is less than 10 000. However, the population structure requires resolving as there may be discrete subpopulations (Peddemors & Harcourt 2006, pers. comm.).\nLack of taxonomic resolution, plus a lack of abundance and distribution data do not allow definitive assessment of the likelihood for subpopulations within Australian populations of Sperm Whale.\nBased on a generation length of 26.5 years, it is estimated that there has been approximately a two-thirds reduction in the global pre-whaling stock size over the past three generations. However, the global population appears to be slowly recovering, with reports indicating an increase in population size over the last 20 years (Whitehead 2002).\nLarge male Sperm Whales have suffered greatest from whaling activities. For example, estimates of the Southern Hemisphere 'Division 5' Sperm Whale population (90\u0096130° E, i.e. including animals caught off Albany, Western Australia) was estimated, in 1980, to have declined by 91% for males over 20 years of age compared to the decline of 26% for females over 13 years between 1947 (taken as the start of major 20th century sperm whaling) and 1979 (cessation of commercial whaling) (Bannister et al. 1996; Kirkwood & Bannister 1980; Kirkwood et al. 1980).\nThe complex social structure of Sperm Whales precludes accurate assessment of the scale of population fluctuations. It is likely that female and immature Sperm Whales are resident in tropical and subtropical waters year-round, although they may move large distances, as indicated by re-sightings of identified individuals between the Gulf of California and the Galapagos Islands (Jaquet et al. 2003). In

contrast, mature male Sperm Whales undergo large-scale migration between the tropics and the Antarctic, implying that, at least for this portion of the population, extreme fluctuations in population numbers, extent of occurrence and area of occupancy do occur.\nKey localities for Sperm Whales in Australia include the area between Cape Leeuwin and Esperance, Western Australia, close to the edge of the continental shelf (averaging 20\u009630 nm offshore); the region south-west of Kangaroo Island, South Australia; deep waters off the Tasmanian west and south coasts; areas off southern NSW, including Wollongong; and the deep water off Stradbroke Island, Queensland (Bannister et al. 1996).\n\r\n \r\n \r\n \r\n \r\n Land Tenure of Populations\r\n \r\n \r\n Top\r\n \r\n \r\n \r\n All cetaceans are protected within The Australian Whale Sanctuary under the EPBC Act. The Sanctuary includes all Commonwealth waters from the 3 nm state waters limit out to the boundary of the EEZ (i.e. out to 200 nm and further in some places). Sperm Whales are also subject to IWC regulations and protected within the Indian Ocean Sanctuary and Southern Ocean Sanctuary.\n\r\n \r\n \r\n \r\n \r\n Habitat\r\n \r\n \r\n Top\r\n \r\n \r\n \r\n The habitat of the Sperm Whale is difficult to categorise due to the cosmopolitan nature of this species and its ability to inhabit all oceans. Sperm Whales tend to inhabit offshore areas with a water depth of 600 m or more, and are uncommon in waters less than 300 m deep (NOAA Fisheries Fact Sheet 2006). Female Sperm Whales are generally found in deep waters (at least 1000 m) of low latitudes (less than 40° N, except in the North Pacific where they are found as high as 50° N). These conditions generally correspond to sea surface temperatures greater than 15 °C, and while female Sperm Whales are sometimes seen near oceanic islands, they are typically far from land (NOAA Fisheries Fact Sheet 2006). Concentrations of Sperm Whales are found where the seabed rises steeply from great depth, and are probably associated with concentrations of major food in areas of upwelling (Bannister et al. 1996). Immature males will stay with females in tropical and subtropical waters until they begin to slowly migrate towards the poles, anywhere between ages 4 and 21 years old. Older, larger males are generally found south of about 45° S down to the edge of the Antarctic pack ice (Thiele et al. 2000). On occasion, however, these males will return to the warm water breeding area (NOAA Fisheries Fact Sheet 2006). Sperm Whales occur around Australia's subantarctic islands, such as Macquarie and Heard Island, where they tend to feed on deep water species.\n\r\n \r\n \r\n \r\n \r\n Life Cycle\r\n \r\n \r\n Top\r\n \r\n \r\n \r\n Life history data for Sperm Whales have been obtained mainly from whaling specimens and observations made aboard catcher boats (Bannister et al. 1996; Best 1979; Best et al. 1984; Rice 1989). Reproductive information is primarily based on non-Australian data.\nMale Sperm Whales reach sexual maturity at between 18\u009621 years and 11.0\u009612.0 m in length, while females are sexually mature at between 7\u009613 years old and 8.3 to 9.2 m in length (Bannister et al. 1996). Sperm Whales can live to ages in excess of 60 years (Rice 1989). \nKnown non-anthropogenic threats to Sperm Whales include predation, competition, and disease. There are many documented cases of strandings, some including entire adult groups, for which the cause of the stranding is unknown (National Marine Fisheries Service 2006; Rice 1989). Sperm Whale calves are subject to predation by Killer Whales (Arnbom et al. 1987) and possibly large sharks (Best et al. 1984). Adult Sperm Whales have been recorded being attacked and killed by Killer Whales (Pitman & Chivers 1998), and harassed and attacked by Pilot Whales (Globicephala spp) and False Killer Whales (Pseudorca crassidens). However, observations of harassment by these latter two species do not appear to have resulted in death of the Sperm Whales (Palacios & Mate 1996; Weller et al. 1996). Fighting also occurs between adult male Sperm Whales (Best 1979; Caldwell et al. 1966; Clarke & Paliza 1988; Kato 1984; Whitehead 1993).\nLittle is known about the role of disease in determining Sperm Whale natural mortality rates (Lambertsen 1977). Only two naturally occurring, and likely lethal, diseases have historically been identified in Sperm Whales: myocardial infarction associated with coronary atherosclerosis, and gastric ulceration associated with nematode infection (Lambertsen 1977). Recent evidence also suggests that Sperm Whales may suffer from bone necrosis as a result of decompression sickness, or what is called the 'bends' in humans (Moore & Early 2005).Sperm Whales are seasonal breeders, but the mating season is prolonged, extending from late winter through to early summer (Whitehead 2002a). Prime-aged bulls, in their late 20s and older, rove among groups of females on the tropical breeding grounds looking for mating opportunities. Female groups develop synchronous estrus cycles, allowing males to visit only briefly yet achieve maximal breeding success. As a result, a male's association with a female group can be as brief as a few hours (National Marine Fisheries Service 2006). \nIn the Northern Hemisphere, conceptions may occur from January to August, peaking in April and May, while in the Southern Hemisphere, conceptions occur from July to March, peaking in September and December (CRRU Fact Sheet 2006). Calves may be born in tropical and temperate waters and are mainly born between November and March (Bannister et al. 1996). The gestation period for Sperm Whales is thought to be 14.5\u009616.5 months and lactation extends for at least 18 months (Whitehead 2002a). Sperm Whale

calves begin taking solid food before they are one year old, although some whales may continue to suckle sporadically for as long as 13 years.\nMatrilineal groups are the basic unit of social organisation in Sperm Whales, and consist of whales from several generations. Within Sperm Whale nursery schools, there may be communal caring for calves as female Sperm Whales are known to display considerable altruism towards other group members when needed (e.g. if injured). Sperm Whale calves are attended by several different adults who may perform a babysitting role while the mother and other adults are foraging. Young male Sperm Whales may also be involved in calf caring. \nNo specific calving localities are recognised in Australian waters. There are no known reproductive behaviours that may make Sperm Whales vulnerable to a threatening process, although a calving interval of four to six years leads to a slow reproductive capacity (Bannister et al. 1996).\n\r\n \r\n \r\n \r\n \r\n Feeding\r\n \r\n \r\n Top\r\n \r\n \r\n \r\n The major food for Sperm Whales comprises oceanic cephalopods, frequently taken at depth (Clarke 1980). While Sperm Whales feed primarily on large and medium sized squids, the list of documented food items is fairly long and diverse. Prey items include other cephalopods such as octopuses, and medium and large-sized demersal fishes, including rays, sharks and many teleosts (Bearzin 1972; Clarke 1977, 1980; Rice 1989).\nSperm Whales are deep and prolonged divers and can therefore feed throughout the entire water column, even in very deep areas. However, they seem to forage mainly on or near the bottom, often ingesting stones, sand, sponges, and other non-food items (Rice 1989; Whitehead et al. 1992). As far as is known, Sperm Whales feed regularly throughout the year. Lockyer (1981) estimated that they consumed about 3.0\u00963.5% of their body weight per day.Several theories on how Sperm Whales hunt have been proposed, including: the use of echolocation to scan for prey; the detection (in the dark) of squid by their luminous organs; random searching for prey by Sperm Whales swimming with their mouths open (suggested following the discovery of a Sperm Whale with its lower jaw entangled in a deep sea cable); and, the use of the whales' white lips to attract prey into the open mouth (CRRU 2006). Sperm Whales are known to co-ordinate their foraging dives, and they sometimes forage in a rank, often over 500 m long, with whales spread out underwater (Whitehead 2002a).\nSperm Whale depredation of fishing longlines has been recorded throughout their range (Rice 1989), particularly in the subantarctic, around islands such as South Georgia (Ashford et al. 1996). Direct action taken by fishermen to protect their catch and gear from depredation by Sperm Whales could result in serious injury or mortality of the whales. This habit of attacking fishing lines therefore exposes Sperm Whales to a threatening process.\n\r\n \r\n \r\n \r\n \r\n Movement Patterns\r\n \r\n \r\n Top\r\n \r\n \r\n \r\n Female and young male Sperm Whales appear to be restricted to warmer waters, i.e. north of approximately 45° S in the Southern Hemisphere, while adult males travel to and from colder waters of Antarctica (Bannister et al. 1996). In Australian waters, Sperm Whales seem to be concentrated in a narrow area only a few miles wide at the shelf edge off Albany, Western Australia, moving westwards through the year (Bannister et al. 1996). In the open ocean, there is a generalised movement of Sperm Whales southwards in summer, and corresponding movement northwards in winter, particularly for males (Whitehead 2002a).\n\r\n \r\n \r\n \r\n \r\n Survey Guidelines\r\n \r\n \r\n Top\r\n \r\n \r\n \r\n Distinctiveness\nSperm Whales are easily recognisable, distinguished by their extremely large head, which represents 25\u009635% of its total body length. In addition, they are the only living cetacean with a single blowhole asymmetrically situated on the left side of the head near the tip. This results in a uniquely angular blow that is diagnostic at sea (Jefferson et al. 1993). They also have small dorsal fins that are low, thick, and usually rounded. Sperm Whales will often raise their tails on initiation of a deep dive (known as 'fluking'), exposing the short tail stock posterior to the dorsal fin and thick ventral keel behind the anus (Leatherwood & Reeves 1983). The tail flukes are very triangular and often have a variably-shaped trailing edge and a deep central notch. Only Humpback Whales and Gray's Beaked Whales are likely be confused with Sperm Whales, and this only at a great distance (Jefferson et al. 1993).\nIf seen underwater or as a stranding on the beach, Sperm Whales may be distinguished by their distinctive underslung and extremely long and narrow lower jaw. The jaw may contain between 17\u009629 pairs of mandibular teeth measuring up to 25 cm long in very old males (Leatherwood & Reeves 1983). When the mouth is closed the teeth fit into circular depressions in the palate of the upper jaw in which vestigial teeth are found at the apex of these depressions. The lips and lower jaw are white.Detectability\nSperm Whales swim fairly slowly when at the surface, rarely exceeding 7.5 km/hr unless disturbed, although they can swim at bursts of 30 km/hr (CRRU Fact Sheet 2006). They may remain at the surface for extended periods of time, without moving between blows. This enables easy detection of surface resting Sperm Whales. They are a deep diving species and are able to perform long and deep dives, often lasting 60\u009690 minutes (CRRU 2006) and thereby easily avoiding detection. When resting and socialising, the ventilation pattern changes, becoming less obvious and regular than the strong four to six blows per minute which are common before a deep dive (CRRU 2006). Sperm Whales often perform aerial

behaviours including breaching and lobtailing. These behaviours often occur in a social context and when groups are splitting or joining. Single whales also breach and lobtail.\nRecommended methods\nCetacean surveys are constrained by several important factors including weather (e.g. sea state and light conditions), area to be covered, aim of the survey (abundance estimate versus ecological studies), the activities of the animals themselves (e.g. traveling, resting, surface versus deep feeding), and the type of craft used for the survey. \nSurveys for oceanic cetaceans such as Sperm Whales have primarily been boat-based transects, although a series of aerial surveys flown off Albany, Western Australia, (Bannister 1968) were specific for Sperm Whales. There are almost no dedicated cetacean surveys conducted in continental Australian waters, but surveys conducted in the Antarctic and subantarctic have covered substantial portions of potential range of male Sperm Whales. During non-dedicated surveys, a minimum requirement is to record all cetacean sightings encountered with corresponding GPS position, environmental data (sea conditions and habitat) and behavioural observations. From fishing vessels, all incidentally caught animals should be recorded with corresponding GPS position, plus attempts should be made to obtain basic biological information from dead animals (Peddemors 2006, pers. comm.).\n\r\n \r\n \r\n \r\n \r\n Threats\r\n \r\n \r\n Top\r\n \r\n \r\n \r\n Overfishing of Sperm Whales in the early to mid-19th century, largely from pelagic United States, United Kingdom, and French vessels, caused some population declines (Best 1983), probably affecting Australian numbers. During the 20th century, Sperm whaling occurred from Albany, Western Australia in several phases, most recently from 1955 to 1978 (Kirkwood et al. 1980). Additionally, pelagic whaling in the south-east Indian, Southern and south-west Pacific Oceans (including Tasman Sea), caused significant Sperm Whale stock decline, especially off south-west Western Australia (Bannister et al. 1996). It is hypothesised that the reduction of breeding males through whaling possibly caused a decreased female reproductive rate. \nCurrent threats to Sperm Whales primarily include collision with large vessels on shipping lanes beyond the edge of the continental shelf, seismic operations in similar areas causing evasive responses, entrapment in fishing gear (including 'ghost nets'), and illegal whaling or a resumption of legal commerical whaling. Pollution, including increasing amounts of plastic debris at sea, oil spills and dumping of industrial wastes into waterways and the sea, leading to bio-accumulation of toxic substances in body tissues is an unquantified threat to Sperm Whales (Reeves et al. 2003).\nSperm Whales are among the cetaceans most likely to be sensitive to disturbance by loud or unfamiliar noise. Their deep-ocean distribution and far-ranging movements put them in potential conflict with a wide array of human activities, including mineral exploration and exploitation (e.g., seismic testing), military manoeuvres, and research using acoustic methods (National Marine Fisheries Service 2006). \nThe calving interval for Sperm Whales is four to six years for prime-aged females and apparently much longer for females older than 40 years (Rice 1989). This low reproductive rate, plus the stable long-term associations between related and unrelated females forming the core groups of Sperm Whale social structure imply that population recovery is likely to be a slow process (Christal 1998).\n\r\n \r\n \r\n \r\n \r\n Threat Abatement and Recovery\r\n \r\n \r\n Top\r\n \r\n \r\n \r\n Bannister and colleagues (1996) recommended the following actions be taken to better understand the threats to Sperm Whales:Determine the distribution and monitor abundance of Sperm Whales in Australian waters, with particular emphasis on the areas off south-west Western Australia, Tasmania and southern NSW. This should be done via a series of aerial surveys and, perhaps, a vessel-based sighting program to monitor numbers. There should be consideration to pool existing sightings and strandings data to locate possible concentration areas.\n Obtain information on Sperm Whale diet to assess any possible impact of the fishing industry on Odontocete food resources, especially for species such as deep-sea cephalopods. \n Obtain basic biological information (including diet and pollutant levels) from incidentally-caught and stranded Sperm Whale specimens, ensuring specimens are made available to appropriate scientific museums to enable collection of life history data and tissue samples for genetic analysis. \n Ensure continued cooperation with other national and international agencies conducting research in relevant neighbouring ocean areas in accordance with Australian Government initiatives for research in the Southern Ocean Sanctuary. \n Undertake yacht-based studies, including telemetry, of behaviour and ecology in suitable areas, possibly off southern NSW and south-east Queensland. \nCurrent projects initiated to address these threats include a requirement to report all incidental catches made within the Australian EEZ (Bannister et al. 1996). Disentanglement workshops have also been initiated, and may be particularly relevant for offshore fishers, and suitable action plans are being developed.\n\r\n \r\n \r\n \r\n \r\n Marine Bioregional Plans\r\n \r\n \r\n Top\r\n \r\n \r\n \r\n Marine bioregional plans have been developed for four of Australia's marine regions - South-west, North-west, North and Temperate East. Marine Bioregional Plans will help improve the way decisions are made under the EPBC Act, particularly in relation to the protection of marine biodiversity and the sustainable use of our oceans and their resources by our marine-based industries. Marine Bioregional Plans improve our understanding of

Australia's oceans by presenting a consolidated picture of the biophysical characteristics and diversity of marine life. They describe the marine environment and conservation values of each marine region, set out broad biodiversity objectives, identify regional priorities and outline strategies and actions to address these priorities. Click here for more information about marine bioregional plans.\nThe sperm whale has been identified as a conservation value in the South-west Marine Region. See Schedule 2 of the South-west Marine Bioregional Plan (DSEWPaC 2012z) for regional advice. Maps of Biologically Important Areas have been developed for sperm whale in the South-west Marine Region and may provide additional relevant information. Go to the conservation values atlas to view the locations of these Biologically Important Areas. The \"species group report card - cetaceans\" for the South-west Marine Region provides additional information.\n\r\n \r\n \r\n \r\n \r\n Management Documentation\r\n \r\n \r\n Top\r\n \r\n \r\n \r\n The following documents may inform and assist in the management of the Sperm Whale:\nThe Action Plan for Australian Cetaceans (Bannister et al. 1996)\n Review of the Conservation Status of Australia's Smaller Whales and Dolphins (Ross 2006) \n Industry Guidelines on the Interaction between offshore seismic exploration and whales (DEW 2007h)\n Australian National Guidelines for Whale and Dolphin Watching Guidelines (Department of the Environment and Heritage (2005e)\nThe North Marine Bioregional Plan: Bioregional Profile: A Description of the Ecosystems, Conservation Values and Uses of the North Marine Region (DEWHA 2008) North-West Marine Bioregional Plan: Bioregional Profile: A Description of the Ecosystems, Conservation Values and Uses of the North-West Marine Region (DEWHA 2008b)The South-West Marine Bioregional Plan: Bioregional Profile: A Description of the Ecosystems, Conservation Values and Uses of the South-West Marine Region(DEWHA 2008a)\nThreat abatement plan for the impacts of marine debris on vertebrate marine life (DEWHA 2009t).\n\r\n \r\n\r\n\r\n\r\n \r\n \r\n Species Profile References\r\n \r\n \r\n Top\r\n \r\n \r\n \r\n \r\n Arnbom T, Papastravrou V., L.S. 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